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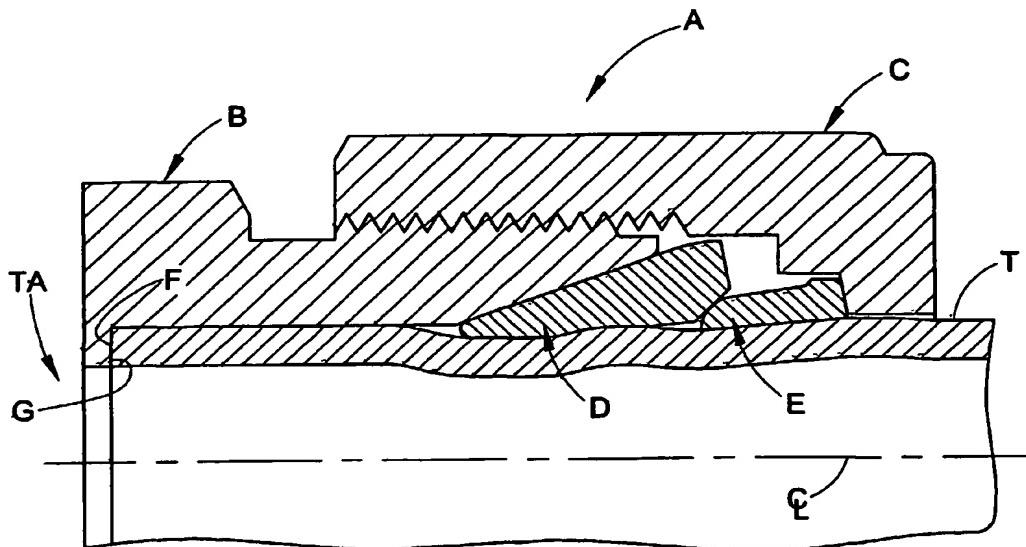
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(54) Title: ULTRASONIC TESTING OF FITTING ASSEMBLY FOR FLUID CONDUITS WITH A HAND-HELD APPARATUS



(57) Abstract: Hand-held apparatus and method for determining relative and/or absolute axial position of a conduit end within a fluid coupling includes application of input ultrasonic energy in the form of transient shear waves and analyzing the reflected energy. Application of the input energy collected at different radial positions about a first axial location is used with wavelet based correlation techniques to better analyze the reflected energy signals. Quality of the abutment between the conduit end and a surface associated with the coupling may also be determined as a separate or combined feature of the axial position determination.

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# INTERNATIONAL SEARCH REPORT

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**A. CLASSIFICATION OF SUBJECT MATTER**  
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According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, INSPEC

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6 360 609 B1 (WOOH SHI-CHANG) 26 March 2002 (2002-03-26)	1,5-13
A	abstract; figures 1A,11 column 1, line 13 - column 8, line 41 -----	2-4
Y	WO 99/31499 A (TRICORN GROUP PLC ; MECON LIMITED (GB); GORMAN MICHAEL (GB); HARPER MA) 24 June 1999 (1999-06-24)	1,5-13
A	abstract; claim 11; figures 1-3,5 page 1, paragraph 1 - page 9, paragraph 1 -----	2-4
Y	US 3 218 845 A (WORLTON DANIEL C) 23 November 1965 (1965-11-23)	1,5-13
A	the whole document -----	2-4
		-/-

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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## C(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DEUTSCH V ET AL: "3.2 Ultraschallprüfgeräte" ULTRASCHALLPRUEFUNG: GRUNDLAGEN UND INDUSTRIELLE ANWENDUNGEN, 1997, pages 55-73, XP002279058 BERLIN HEIDELBERG NEW YORK page 70, last paragraph; figure 3.34 -----	1,5-13
A	SADOWSKY J: "Investigation of signal characteristics using the continuous wavelet transform" JOHNS HOPKINS APL TECH. DIG. (USA), JOHNS HOPKINS APL TECHNICAL DIGEST, JULY-SEPT. 1996, JOHNS HOPKINS UNIV. APPL. PHYS. LAB, USA, vol. 17, no. 3, July 1996 (1996-07), pages 258-269, XP009032917 ISSN: 0270-5214 the whole document -----	2-4
Y	SADOWSKY J: "Investigation of signal characteristics using the continuous wavelet transform" JOHNS HOPKINS APL TECH. DIG. (USA), JOHNS HOPKINS APL TECHNICAL DIGEST, JULY-SEPT. 1996, JOHNS HOPKINS UNIV. APPL. PHYS. LAB, USA, vol. 17, no. 3, July 1996 (1996-07), pages 258-269, XP009032917 ISSN: 0270-5214 the whole document -----	8
A	US 3 287 813 A (ZAHURANEK EMERY J ET AL) 29 November 1966 (1966-11-29) cited in the application the whole document -----	2-4

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 01/19133

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
US 6360609	B1	26-03-2002	WO	0163276 A1		30-08-2001
WO 9931499	A	24-06-1999	GB	2332274 A		16-06-1999
			AU	735710 B2		12-07-2001
			AU	1497199 A		05-07-1999
			CA	2312394 A1		24-06-1999
			EP	1038175 A1		27-09-2000
			WO	9931499 A1		24-06-1999
			US	6474165 B1		05-11-2002
US 3218845	A	23-11-1965	NONE			
US 3287813	A	29-11-1966	NONE			